WORKING DRAFT

Whitefish Urban Corridor Study of US Highway 93
Technical Memorandum – Task 17

Analysis of the Existing Corridor Transportation System

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TECHNICAL MEMORANDUM – TASK 17
Analysis of the Existing Transportation System

This Technical Memorandum examines the existing transportation system within the study area for the US 93 Urban Corridor in the City of Whitefish. This memorandum presents the results of work associated with Task 17 in the Scope of Work for the Whitefish Transportation Plan and Urban Corridor Study.

For purposes of this study, the Whitefish Urban Corridor is assumed to include the existing section of US 93 (Spokane Avenue and 2nd Street) from its intersection with 13th Street (Reference Post 126.9) north to 2nd Street and 2nd Street East from Spokane Avenue to just west of Baker Avenue (Reference Post 127.8). This area corresponds to the previously established limits for the "Whitefish-Urban" project, designated by MDT as NH 5-3(80)127, UPN 4781.

The corridor includes the areas affected by the sub-alternatives for Location Alternative C (existing highway corridor) and considered in the U.S. Highway 93 Somers to Whitefish Final Environmental Impact Statement (FEIS) and subsequent Record of Decision (ROD) on the FEIS. Specifically, this includes Baker Avenue from 2nd Street East to Spokane Avenue, and 7th Street between Baker and Spokane Avenues.

TRANSPORTATION ROLES SERVED BY US 93

US 93 fulfills a variety of transportation roles and provides important transportation linkages within the western United States, the State of Montana, Flathead County, and the City of Whitefish. US 93 is the primary transportation facility in the Whitefish Urban corridor, serving automobile, truck, public transportation, bicycle and pedestrian modes. The regional, state, and local transportation roles of US 93 are described below.

Regional Transportation Role of US 93. US 93 is a major north-south highway in the Western United States extending more than 1,450 miles from Arizona to the Canadian border in Montana. In addition to Arizona and Montana, US 93 passes through portions of Nevada, Utah and Idaho. At the Port of Roosville on the Montana-British Columbia border, US 93 becomes British Columbia Highway 93 which serves the Kootenay Rockies region of the province and connects with the Trans-Canada highway in the southeastern portion of the province.

US 93 is important to interstate travel and international movements of freight from British Columbia into the western United States. Data from the U.S. Department of Transportation, Bureau of Transportation Statistics shows the Port of Roosville (located about 49 miles north of Whitefish) recorded 14% of all incoming truck crossings and more than 17% of all incoming personal vehicle crossings at Ports on the U.S.-Canadian border in Montana during 2003.

Statewide Transportation Role of US 93. US 93 has served as a major state highway in western Montana for many decades. US 93 is a north-south principal arterial on the National Highway System that serves as the primary travel corridor between Interstate 90 at Missoula and the three major cities in Flathead County—Kalispell, Whitefish and Columbia Falls. The route links Polson, the county seat of Lake County, with Kalispell, the seat of Flathead County's government.

US 93 intersects Montana Highway 40 about 1.5 miles south of the Whitefish Urban corridor. Highway 40 connects with US Highway 2, a major east-west regional and state highway 7 miles to the east and links Whitefish with Columbia Falls.

US 93 receives significant use by tourists and other visitors headed to and from Glacier National Park, Flathead Lake, recreation areas, wildlands, and cities within the Flathead region. The route also serves the logging industry and agriculture in northwest Montana.

Local Transportation Role of US 93. US 93 serves a variety of local transportation roles including accommodating regional through traffic, recreational visitors to the region, commuters traveling between work destinations and home, and routine daily travel by Flathead County residents. US 93 intersects US 2, another important arterial route, in the center of Kalispell. US 93 provides a direct link between Kalispell and Whitefish.

Within the Whitefish community, US 93 functions as one of the city's "main streets" and provides access to commercial strip development along Spokane Avenue from the Montana Highway 40 intersection northward to the Whitefish River and to the City's historic downtown area. Indirectly, US 93 serves as the principal route for visitors and residents to access Whitefish Mountain Resort, Whitefish Lake, and other public recreation sites in or near the community.

US 93 AND ADJOINING ROADS AND STREETS

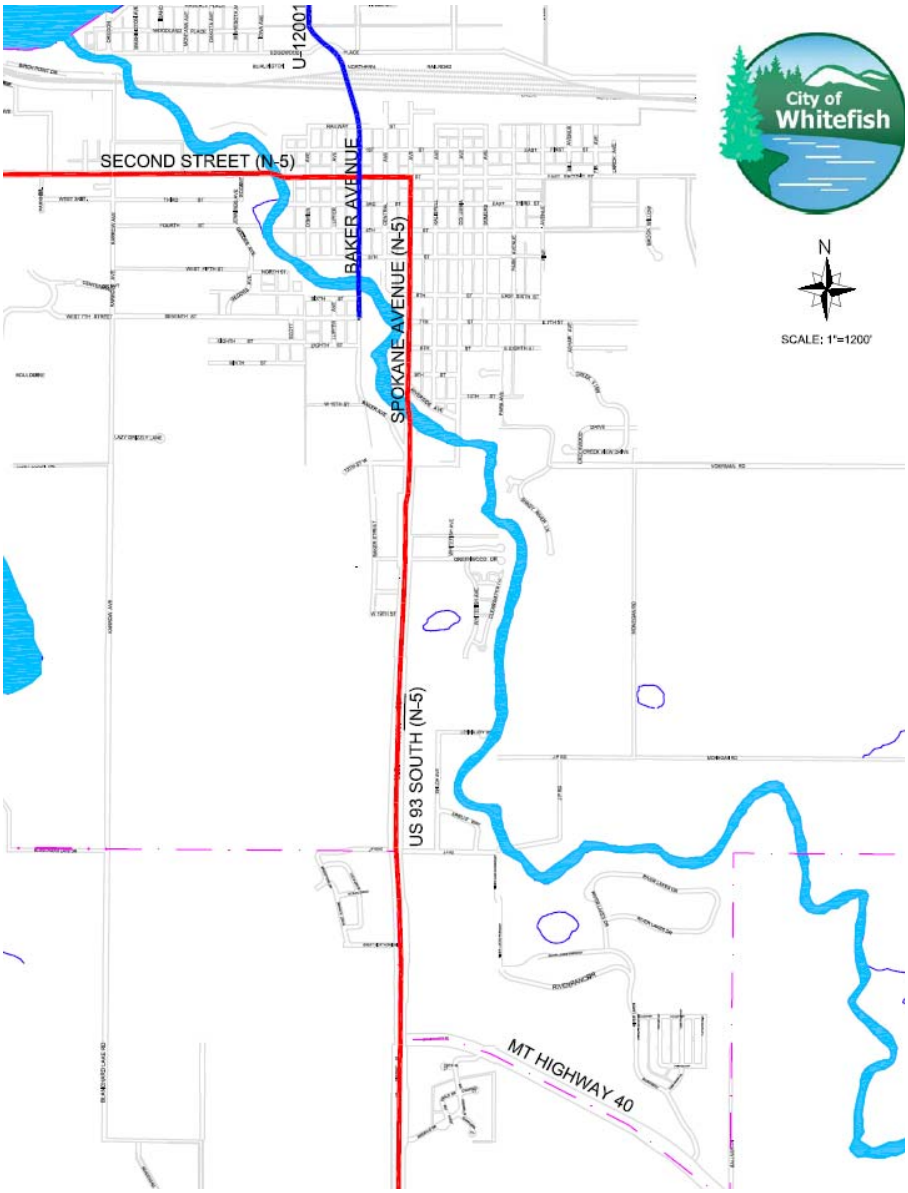
US 93 (Spokane Avenue and 2nd Street)

US 93 (designated as route N-5 on **Figure 1**) is located in the center of the Whitefish community and serves as the primary travel route through the City of Whitefish for both residents and visitors. The US 93 corridor in Whitefish includes **US 93 South** from the junction of Montana Highway 40 to 13th Street, **Spokane Avenue** from 13th Street to 2nd Street and **2nd Street** from Spokane Avenue westward. North of Montana Highway 40, Spokane Avenue runs north to south and is located entirely within the Whitefish city limits. At 2nd Street, US 93 turns west and generally remains within the city limits west of Karrow Avenue to the Whitefish Lake Golf Club.

US 93 functions as the "backbone" of a larger road and street network in Whitefish with notable intersecting roads and streets including: J.P. Road, West 18th Street/Greenwood Drive, 13th Street, the street network in the City's core area, and Karrow Avenue located west of downtown. Consequently, when congestion and poor service levels occur on US 93, the effects are not just confined to the state highway system. Poor performance of US 93 translates into delays and congestion on local cross streets, ultimately affecting the efficient movement of traffic on other important local collectors and arterials. This condition is exacerbated by the fact that few alternate and continuous north-south or east-west routes exist in the community.

Beginning at Montana Highway 40 and extending to 13th Street, US 93 transitions from a four-lane divided highway road to a five-lane urban roadway with two travel lanes in each direction and a center two-way left turn lane. The section of US 93 serves numerous highway-oriented businesses, various retail establishments, restaurants, professional offices, auto sales and services, hotels/motels, supermarkets, a shopping mall, and convenience stores with fuel sales. North Valley Hospital and a large condominium development are located east of US 93 and north of Montana Highway 40.

FIGURE 1: US 93 through Whitefish



According to MDT's *Montana Roadlog*, Spokane Avenue begins at intersection with 13th Street. From 13th Street to the Whitefish River crossing, the character of Spokane Avenue changes notably as the roadway transitions from a five-lane roadway to a two-lane road. Between 13th Street and the Whitefish River crossing, Spokane Avenue has been reconstructed and upgraded in response to traffic demands and access needs on adjoining commercial lands.

North of the Whitefish River crossing, Spokane Avenue serves highway-oriented businesses, professional offices, a traditional residential neighborhood, and a variety of uses in downtown Whitefish. Highway-oriented commercial uses can also be found along Spokane Avenue from the Whitefish River crossing to 6th Street. Between 6th and 4th Streets, Spokane Avenue passes through a traditional residential neighborhood where land uses adjacent to the highway are transitioning from single-family and multi-family residences to commercial and office uses.

North of 4th Street, US 93 enters downtown Whitefish and turns westward at 2nd Street. The downtown area includes retail commercial uses, professional and government offices, financial institutions, restaurants and taverns, hotels, and art galleries and studios. Between Spokane Avenue and O'Brien Avenue, 2nd Street bisects Whitefish's central business district and includes one of the City's busiest intersections at Baker Avenue.

Intersections along Spokane Avenue and 2nd Street are identified and described in **Table 1**.

Table 1: Intersections along the US 93 Corridor

SPOKANE AVENUE		
Intersecting Street(s)	**Functional Class**	**Description**
13th Street	Collector	Connects to Columbia Avenue east of Spokane Avenue and to Baker Avenue west of Spokane. Both Columbia and Baker provide alternate north-south travel corridors. Former North Valley Hospital site east of Spokane will be redeveloped with residential uses/condominiums.
Riverside Avenue (East side only)	Local Street	Serves residential areas east of Spokane Avenue.
9th Street (East side only)	Local Street	Serves residential areas east of Spokane Avenue and highway commercial uses along Spokane.
8th Street (East side only)	Local Street	Serves residential areas east of Spokane Avenue and highway commercial uses along Spokane.
7th Street (East side only)	Local Street	No formalized intersection. Serves highway commercial uses along Spokane.
6th Street	Local Street	Serves residential areas east and west of Spokane Avenue and connects to Central Avenue for access to/from downtown area. Can be used to access Muldown Elementary School and Whitefish High School east of corridor.
5th Street	Local Street	Serves residential areas east and west of Spokane Avenue. One of major routes used to access Muldown Elementary School and Whitefish High School east of corridor. Designated as a Proposed Bikeway by City.
4th Street	Collector (East of Spokane Avenue)	Serves residential areas east of Spokane Avenue and office commercial uses on edge of downtown. Can be used to access Muldown Elementary School and Whitefish High School east of corridor.
3rd Street	Local Street	Serves residential areas east of Spokane Avenue and office and commercial uses on edge of downtown.
2nd Street **2nd Street East**	Principal Arterial (West of Spokane Avenue) Collector (East of Spokane Avenue)	2nd Street East serves Central School, residential areas to the east and Memorial and Armory Parks. 2nd Avenue East also connects to an at-grade railroad crossing on the east edge of the city. Designated as a Bikeway by City. A new parking structure is being designed for the northwest quadrant of the Spokane/2nd Street intersection.

Table 1: Intersections along the US 93 Corridor (Cont.)

2nd STREET		
Intersecting Street(s)	**Functional Class**	**Description**
Spokane Avenue	Principal Arterial (South of 2nd Street) Local Street (North of 2nd Street)	Serves Whitefish Downtown area, Central School, and office and commercial uses along Spokane Avenue.
Central Avenue	Local Street	Serves Whitefish Downtown area. Design plans for the reconstruction of Central Avenue are currently being developed by the City.
Baker Avenue	Minor Arterial	Serves Whitefish Downtown area. Baker Avenue connects to Wisconsin Avenue over railroad viaduct and serves the north portion of the City and provides access to Whitefish Mountain Resort.

Baker Avenue

Although not officially part of US 93, Baker Avenue operates "hand-in-hand" with US 93 to move traffic through Whitefish. The importance of Baker Avenue as an integral element of the local transportation system was demonstrated in the U.S. Highway 93 Somers to Whitefish FEIS. The FEIS developed and analyzed numerous "couplet" alternatives that used Baker Avenue along with Spokane Avenue and 2nd Street to accommodate travel demands in the US 93 corridor. Design work for MDT's Whitefish-Urban project and the Whitefish Transportation Plan, continue to recognize that Baker Avenue plays an important role in meeting current and future travel through Whitefish.

Baker Avenue (a portion of which is designated as route U-12001 as shown on **Figure 1**) is located two blocks west of Spokane Avenue and extends from West 19th Street in the southern portion of the city to Railway Street at the north edge of downtown Whitefish. Baker Avenue is one of the few continuous north-to-south roadways in the community that can be used as an alternate route to US 93 and connects to the only grade-separated crossing of the Burlington Northern Santa Fe Railway in Whitefish. Baker Avenue (via Wisconsin Avenue) comprises the principal route used to access Whitefish Mountain Resort.

Between 13th Street and 10th Street, Baker Avenue primarily serves commercial uses and professional offices. From 10th Street to the Whitefish River crossing, Baker Avenue serves a neighborhood consisting mostly of single family residences. North of the Whitefish River, Baker Avenue enters and passes through the downtown before crossing over the BNSF Railway and transitioning to Wisconsin Avenue.

Intersections along Baker Avenue are identified and described in **Table 2**.

Table 2: Intersections along Baker Avenue

Intersecting Street(s)	Functional Class	Description
2nd Street	Principal Arterial	Serves office and commercial uses along 2nd Street. Whitefish City Hall, currently located at the northeast corner of 2nd Street and Baker Avenue, may be relocated to a site near the Whitefish Library in the future.
3rd Street	Local Street	Serves office and commercial uses.
4th Street	Local Street	Serves office and commercial uses including the Whitefish Post Office.
5th Street (East) (Park access to West)	Local Street	Serves southern portion of downtown Whitefish and residences fronting Central Avenue. Provides access to parking areas for Riverside Park west of Baker.
6th Street (West side only)	Local Street	Serves residential areas west of Baker Avenue.
7th Street (West side only)	Collector	Serves residential areas west of Baker Avenue and connects to Karrow Avenue.
8th Street (West side only)	Local Street	Serves residential areas west of Baker Avenue.
10th Street	Local Street	Serves commercial and office uses along Baker Avenue.
13th Street	Collector	Serves commercial development and retail uses along Baker Avenue including Baker Commons development.

FUNCTIONAL CLASSIFICATION

US 93 is part of the National Highway System (NHS) in Montana. The NHS consists of over 3,850 miles of the state's most important transportation routes including the Interstate highway system, other principal arterials, and other highways essential to the nation's strategic defense policy or that link military installations. US 93 links the Flathead Valley to I-90 west of Missoula.

US 93 in Whitefish is functionally classified as a Principal Arterial. MDT owns and maintains US 93 through the City.

Baker Avenue is functionally classified as a Minor Arterial and portions of the route are on the state's Urban Highway System. Baker Avenue (between 2nd Street and Big Mountain Road) is designated as urban route U-12001. Baker Avenue between 2nd Street and 7th Street is designated as urban route U-12002.

Functional classifications for streets adjoining US 93 and Baker Avenue are shown in **Tables 1** and **2**.

Arterials provide the highest level of mobility, at the highest speed, for long uninterrupted travel. Arterials generally have higher design standards than other roads and many principal arterials have multiple lanes with some degree of access control. Principal arterials typically serve corridors with the highest traffic volume and those with the longest trip lengths. They carry most trips entering and leaving urban areas, and provide continuity for all rural arterials that intercept urban boundaries. Minor arterials provide connecting links to urban principal arterials.

Collectors provide a lower degree of mobility than arterials and are designed for travel at slower

speeds and for shorter distances. In urban areas, the collector system provides traffic circulation within residential neighborhoods and commercial and industrial areas. Urban collectors also channel traffic from local roads onto the arterial system.

LANE CONFIGURATIONS AND TYPICAL SECTIONS

US 93 (Spokane Avenue and 2nd Street)

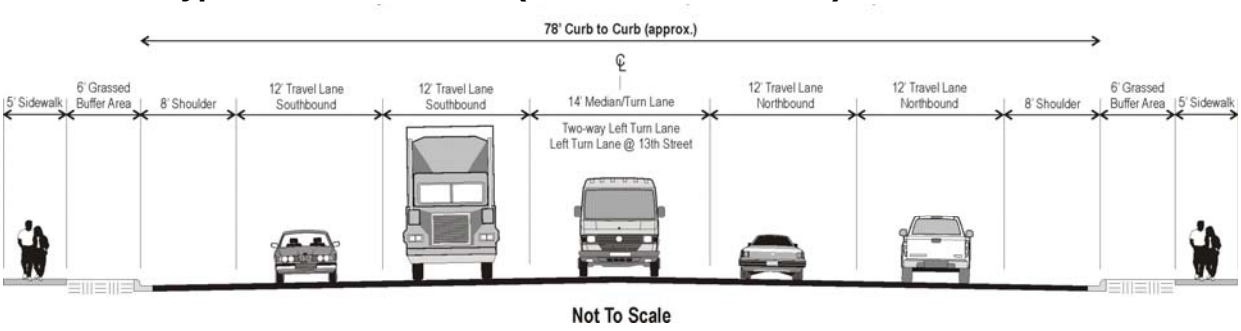
South of 13th Street, US 93 has a 5-lane "urban" design with curbs and gutters, four 12-foot wide through travel lanes, a 14-foot wide center two-way left turn lane, two 8-foot wide shoulders. A grassed buffer area and sidewalks parallel both sides of the highway in this area. MDT's *Montana Roadlog* shows that the roadway has a typical width of 81-feet in this area and narrows to 57 feet wide in the section where the roadway crosses the Whitefish River.

The design of this section of US 93 is illustrated in the following photograph and in **Figure 2**.

US 93 (SOUTH OF 13TH STREET)

Spokane Avenue at 13th Street

FIGURE 2: Typical Section - US 93 (South of 13th Street)



Spokane Avenue transitions from five-lanes to two-lanes between 13th Street and the Whitefish River crossing. As shown in **Figure 3**, this section of Spokane Avenue is generally 40 feet wide and consists of two 12-foot wide driving lanes and two 8-foot wide shoulders or parking lanes. Between the Whitefish River crossing and 6th Street, a 5-foot wide sidewalk exists directly behind the curb along both sides of Spokane Avenue. Between 6th Street and 2nd Street, Spokane Avenue is 40 feet wide (from curb face to curb face) with two 12-foot wide travel lanes and two 8-foot wide shoulders/parking lanes. Boulevards with mature trees and grass and 5-foot wide sidewalks are found along both sides of Spokane Avenue from 6th Street to 2nd Street. Bulb-outs have also been

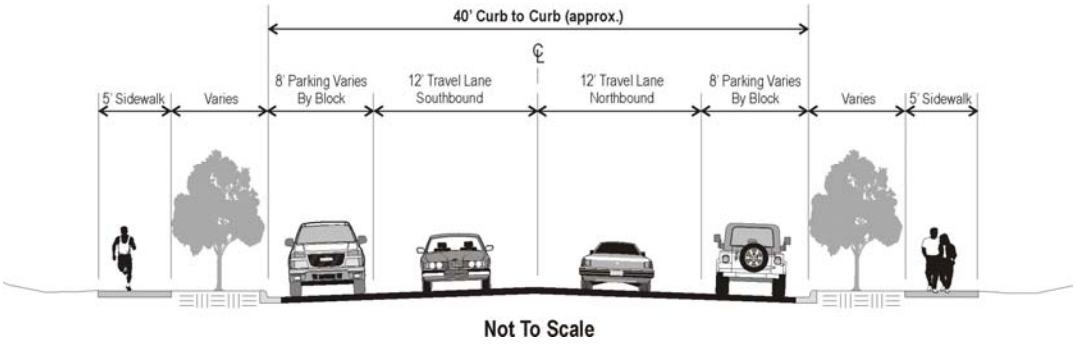
incorporated at 4th and 5th Streets to reduce crossing distances for pedestrians at these intersections.

SPOKANE AVENUE (13TH STREET TO 2ND STREET)

Spokane Avenue south of 6th Street

Spokane Avenue near 4th Street

FIGURE 3: Typical Section -Spokane Avenue (6th Street to 2nd Street)



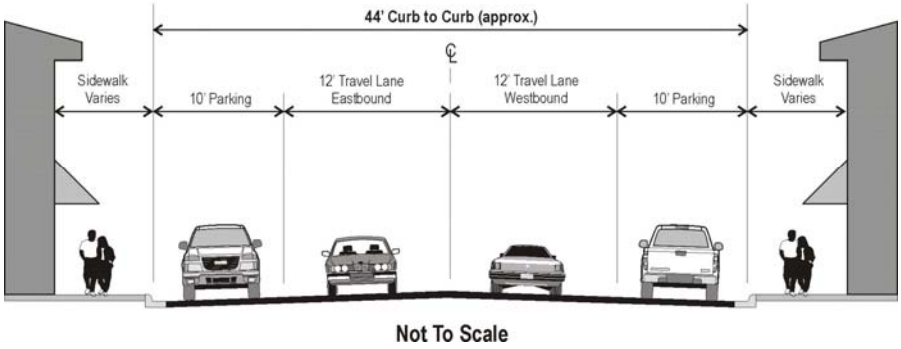
At 2nd Street, US 93 makes a 90-degree turn and continues west out of the City. West of Spokane Avenue, 2nd Street has an overall width of about 44 feet and consists of two 12-foot wide driving lanes, two 10-foot-wide parking lanes, and sidewalks directly behind the curb along each side of the street. **Figure 4** illustrates this design.

2ND STREET (WEST OF SPOKANE AVENUE)

Looking west from Central Avenue

Looking east near Spokane Avenue intersection

Figure 4: Typical Section-2nd Street (Spokane Avenue to Baker Avenue)



Baker Avenue

With the exception of the intersection at 2nd Street where a 12-foot wide left turn lane has been provided for northbound traffic, Baker Avenue has a two-lane configuration. The street is typically 44-feet wide (between curb faces) with two 12-foot wide travel lanes and two 10-foot wide parking lanes. A wide sidewalk immediately behind the curb has been installed along Baker Avenue between 2nd and 3rd Streets. Parking has been eliminated for a short distance on both sides of Baker Avenue south of 2nd Street to accommodate a 12-foot wide left turn lane. The north approach to the Baker Avenue and 2nd Street intersection has been configured with a 10-foot parking lane along the west side of the street, a 12-foot wide left-through-right lane for southbound traffic, a 12-foot wide through lane for northbound traffic, and a 13.5 foot wide parking lane along the east side of the street.

BAKER AVENUE (SOUTH OF 2ND STREET)

Baker Avenue south of 2nd Street

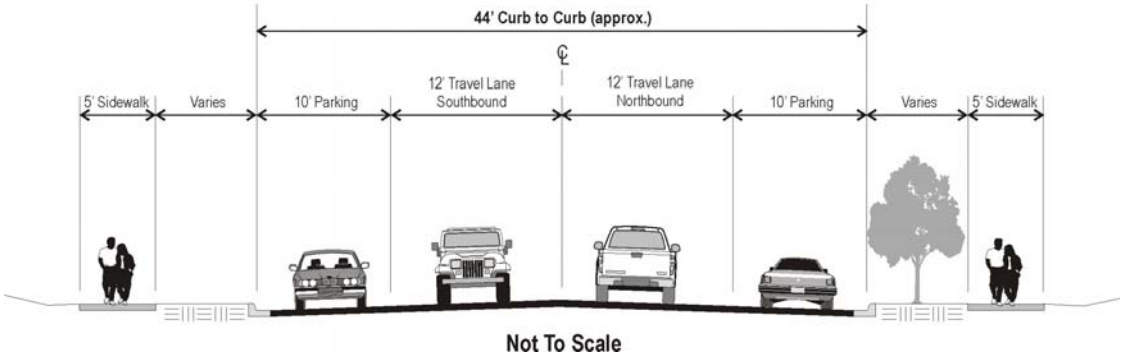
BAKER AVENUE (3RD STREET TO WHITEFISH RIVER)

Baker Avenue near 4th Street

Between 3rd Street and the Whitefish River, the roadway is 44 feet wide with two 12-foot-wide driving lanes and 10-foot wide parking lanes. Landscaped buffer areas and sidewalks parallel Baker Avenue between 3rd Street and the Whitefish River.

Figure 5 illustrates the typical configuration of this section of Baker Avenue.

FIGURE 5: Typical Section-Baker Avenue (3rd Street to Whitefish River)



BAKER AVENUE (WHITEFISH RIVER TO 7TH STREET)

Baker Avenue narrows considerably as it crosses the Whitefish River and its configuration changes in the area between the bridge and 7th Street. This portion of Baker Avenue remains 44-feet wide but has a 14-foot travel lane for southbound traffic, a 12-foot travel lane for northbound traffic, a 4-foot wide bike lane and 10-foot wide parking pullout along the east side of the street. A landscaped buffer and 5-foot wide sidewalk exists along the west side of the road and a 5-foot wide sidewalk exists immediately behind the curb on the east side of Baker in this area. A typical section for this portion of Baker Avenue is shown in **Figure 6**.

Baker Avenue at Whitefish River

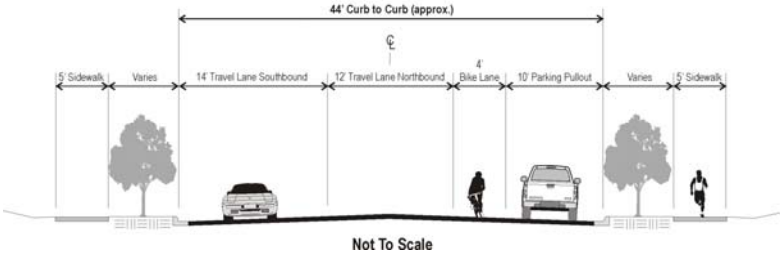


FIGURE 6: Typical Section-Baker Avenue (Whitefish River to 7th Street)

BAKER AVENUE (7TH TO 10TH STREET)

Between 7th Street and 10th Street, Baker Avenue is about 32 feet wide (between the curb faces) with two 12-foot wide travel lanes and 4-foot wide shoulders along both sides of the roadway. Landscaped buffers and 5-foot wide sidewalks exist along both sides of the street. On-street parking is prohibited along this section of Baker Avenue. This typical section is illustrated in **Figure 7**.

Baker Avenue near 7th Street

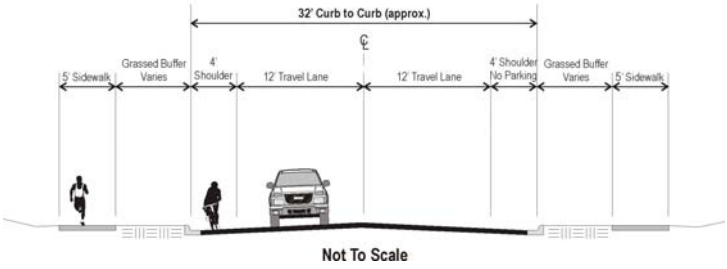


FIGURE 7: Typical Section-Baker Avenue (7th Street to 10th Street)

BAKER AVENUE (10TH TO 13TH STREET)

Between 10th Street and 13th Street, Baker Avenue is about 38 feet wide (between the curb faces) with two 12-foot wide travel lanes and 7-foot wide bike lanes along both sides of the roadway. Landscaped (grass) boulevards and 5-foot wide sidewalks exist along both sides of the street. On-street parking is prohibited along this section of Baker Avenue. **Figure 8** shows Baker Avenue's configuration in this area.

Baker Avenue at 13th Street

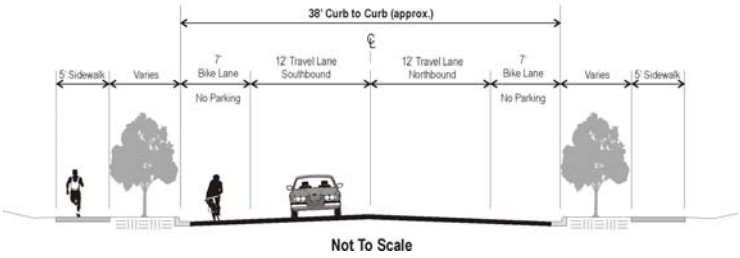


FIGURE 8: Typical Section-Baker Avenue (10th Street to 13th Street)

OTHER PHYSICAL AND OPERATIONAL CHARACTERISTICS

Posted Speeds in the Corridor

According to Section 6-1-5 Paragraph C.3 of the Whitefish City Code, the speed limit on all through streets and arterial highways is typically 35 miles per hour. However, this speed limit has been adjusted for US 93 through the city center. A speed limit of 25 miles per hour has been established for Spokane Avenue between 2nd Street and the south bank of the Whitefish River and on 2nd Street between Spokane Avenue and a point 100 feet west of the Whitefish River.

The posted speed limit on Baker Avenue is typically 25 miles per hour consistent with the requirements of the Whitefish City Code for all other places within the City except for school zones. There are no designated school zones on US 93 or on Baker Avenue. However, a designated school zone with a 15 mph speed limit exists on 2nd Street east of Spokane Avenue in front of Central School.

Intersections/Roadway Geometry

Side streets joining Spokane Avenue, 2nd Street, and Baker Avenue within the corridor are typically perpendicular to the major roadways and form standard three-legged ("T") intersections or standard four-legged intersections. Riverside Avenue, located just north of the Whitefish River, joins Spokane Avenue in a skewed configuration.

Spokane Avenue and 2nd Street are located in level terrain and these streets have only minor variations in vertical alignment. A slight grade exists on Baker Avenue south of 3rd Street as the elevation of the roadway falls toward the Whitefish River. The gently rolling to level terrain along Baker Avenue between the Whitefish River and 13th Street West has resulted in minor variations in the vertical alignment of the roadway.

Traffic Controls and Turning Lanes

Currently, there are seven signalized intersections in the Whitefish area with the majority of the signals being located on US 93 in the downtown area. Traffic signals control intersections on Spokane Avenue at 13th Street and 2nd Street. Traffic signals also exist at 2nd Street's intersections with Central Avenue and Baker Avenue.

All of these traffic signals are owned and operated by the MDT and are pretimed—meaning they operate with fixed cycle lengths and assign rights-of-way to traffic movements according to a predetermined timing schedule for all or parts of the day. Pretimed signals do not adjust to traffic flows and their operation sometimes leads to congestion if unusual traffic patterns develop or if there are major fluctuations in traffic demand on various approaches.

Other roads adjoining Spokane Avenue, 2nd Street, and Baker Avenue are controlled by stop signs.

Few dedicated left or right turn lanes exist on Spokane Avenue, 2nd Street, and Baker Avenue within the corridor. The intersection of Spokane Avenue and 13th Street was reconstructed and improved to include designated left turn lanes on all four approaches.

A left turn lane exists on the east approach and a right turn lane has been installed on the north approach at the intersection of Spokane Avenue and 2nd Street. There are no other dedicated left or right turn lanes on 2nd Street within the corridor.

The intersection of Baker Avenue and 2nd Street has been modified to include a left turn lane and a shared through-right turn lane on the north approach.

Right-of-Way

The majority of the right-of-way for Spokane Avenue, 2nd Street, and Baker Avenue is 70 feet wide. The right-of-way corridor for Spokane Avenue south of 13th Street was substantially expanded to accommodate road widening during previous reconstruction on US 93. In the vicinity of 13th Street, the right-of-way for Spokane Avenue ranges in width from 185 feet to 235 feet.

Bridges

There are no bridges on Spokane Avenue or 2nd Street within the Whitefish Urban corridor. Spokane Avenue crosses the Whitefish River between 13th Street and Riverside Avenue; however, this road crossing is accommodated in two large-diameter culverts. Bridges over the Whitefish River exist on 2nd Street west of the downtown area (in MDT's Whitefish-West project area) and on Baker Avenue between 5th and 6th Streets.

Street Lighting

Overhead street lighting exists along both Spokane Avenue and 2nd Street. Ornamental lighting fixtures have been added along the west side of Spokane Avenue between 4th and 3rd Streets. Similar ornamental lighting fixtures exist along Baker Avenue between the Whitefish River and 13th Street.

Corridor Utilities

Water and Sewer Infrastructure. City of Whitefish water and sewer infrastructure is extensive within the corridor study area. Municipal water and/or sewer lines exist beneath portions of Spokane Avenue, 2nd Street and Baker Avenue and cross these streets at numerous locations.

Reconstruction along the existing US 93 corridor or Baker Street could conflict with municipal water or sewer lines at the following locations:

Spokane Avenue

- 6" diameter water line (from south of 13th Street to Riverside Avenue)
- 8"/12" diameter water line (from south of 13th Street to Riverside Avenue)
- 6" diameter water line (from Riverside Avenue to 7th Street)
- 6" diameter water line (from 7th Street to 2nd Street)
- 27" diameter sewer outfall (parallels Spokane Avenue at 7th Street and crosses Spokane south of Riverside Avenue)
- Sewer line crossings at 13th Street, 5th Street, and between 3rd and 4th Streets

2nd Street

- 10"/12" diameter water line (from Spokane Avenue to Lupfer Avenue)
- Sewer line crossings between Spokane and Central Avenues, between Central and Baker Avenues, and at Lupfer Avenue

Baker Avenue

- 12" diameter water line (from Spokane Avenue south of 13th Street)
- 27" diameter sewer outfall crossing between 5th Street and Whitefish River
- 8" diameter sewer line (from just south of Whitefish River to Baker Mountain Heights area north of 10th Street)
- 8" diameter sewer line (from 10th Street to south of 13th Street)
- Sewer line crossings at4th Street, just south of Whitefish River, and at 13th Street)

It is also likely that individual water or sewer service lines at numerous locations could be affected by highway reconstruction activities.

The City of Whitefish's *Capital Improvement Plan 2007/08 – 2011/12* has identified the need for upgrades to the gravity sewer system within the existing US 93 corridor on Spokane Avenue north of 13th Street and 2nd Street west of Spokane Avenue. The City would upgrade the sewer lines in conjunction with future improvements to US 93.

Storm Drainage Facilities. Curbs and gutters and storm drainage facilities exist along Spokane Avenue, 2nd Street, and Baker Avenue.

Other Utilities. Overhead power lines, overhead and underground telephone cables and fiber optic lines, and natural gas distribution lines cross or exist adjacent to the Spokane Avenue, 2nd Street and Baker Avenue. Some of these utilities may be in conflict with future improvements to the US 93 corridor.

Approaches and Access Control

Between 13th and 6th Streets, commercial properties are typically served by one or two approaches from Spokane Avenue. Newer commercial developments typically have only one access point on Spokane Avenue. Multiple or wide driveway approaches are found at business locations along the east side of Spokane between Riverside Avenue and 8th Street.

In general, the narrow lot configuration in the established residential neighborhood along Spokane between 6th and 2nd Streets is not conducive to individual driveway approaches. With only a few exceptions, property access is generally from alleys or side streets only in this area. Commercial uses have evolved on some of the blocks adjoining Spokane Avenue in central Whitefish and driveway approaches have been developed to serve off-street parking lots associated with businesses.

Lot configurations and the presence of on-street parking have limited the number of driveway approaches along 2nd Street between Spokane and Baker Avenues.

Access is currently unrestricted along Spokane Avenue, 2nd Street, or Baker Avenue within the area under evaluation for this study. MDT has a "systems impact review process" in place to evaluate the potential impacts of new developments on state-maintained highways and must authorize new requests for access along state-maintained routes.

CURRENT TRAFFIC OPERATIONS

Traffic operations are quite variable within the corridor study area. US 93 south of 13th Street has been reconstructed to accommodate roadside commercial development that has occurred within the last two decades in Whitefish. This section of US 93 has been reconfigured in response to the pressure of this development and includes four travel lanes, medians, turn lanes, improved signalization and restructured access to the highway.

North of 13th Street, US 93 (Spokane Avenue and 2nd Street) serves older highway commercial areas, traditional residential neighborhoods, and the city's central business district. As expected, these two-lane streets have a substantially different character and operating conditions than US 93 south of 13th Street.

Baker Avenue assumes several functions between 2nd Street and 13th Street. Baker Avenue serves the downtown core area between 2nd Street and 5th Street, city parks and residential areas between 5th and 10th Streets, and a developing area with new commercial and office uses in the vicinity of 13th Street.

Information about existing traffic conditions on Spokane Avenue, 2nd Street, and Baker Avenue follows including a discussion of current traffic volumes, the level of service (LOS) associated with these traffic volumes, and other operating characteristics.

Current Traffic Volumes on US 93

Traffic has been continuously monitored by MDT at several permanent count locations within the Flathead Valley since the early 1980s. However, the nearest automatic traffic recorders are on US 2 near Kalispell (ATR Station A-24) and on US 2 east of Columbia Falls (ATR Station A-60). Station A-24 is representative of urban traffic on a Principal Arterial roadway similar to US 93. Although the counter does not represent traffic conditions within Whitefish, they do provide an indication of long term traffic growth trends in the Flathead Valley.

Historical traffic count data from MDT's *Montana's Automatic Traffic Recorders 2006* shows an increase in the annual average daily traffic (AADT) at Station A-24 of nearly 60% over the 1991 to 2006 period and an increase in AADT volumes of about 20% since 2000. This data suggests that traffic volumes at this Flathead Valley location has increased by 3 to 4% per year over most of the last two decades. MDT's annual "Traffic by Section" publications do provide a long term record of traffic volumes on US 93 in the Whitefish area. The AADT data provided in the publications were developed from short-term periodic traffic counts conducted by MDT. Data collected over the 1996 to 2006 period shows traffic volumes on US 93 have steadily increased:

- AADTs have increased by nearly 17% on US 93 south of 13th Street;
- AADTs have increased by 8% on US 93 between 13th Street and Baker Avenue; and
- AADTs have increased by more than 13% on US 93 between Baker and Karrow Avenues.

Figure 9 illustrates representative AADT volumes on US 93 and other major streets within the corridor study area. The figure shows US 93 south of 13th Street experiences the highest traffic volumes with average daily traffic volumes in some areas approaching 22,000 vehicles. Traffic

volumes through the remainder of the corridor are variable and range from more than 15,000 vehicles per day (north of 13th Street) to between 8,000 and 10,000 vehicles per day on 2nd Street.

Traffic volumes on Baker Avenue range from about 9,400 vehicles per day south of 2nd Street to nearly 13,000 vehicles per day between the Whitefish River and 13th Street. Between 13,000 and 14,000 vehicles use Baker Avenue north of 2nd Street each day.

FIGURE 9: Current Traffic Volumes within the Corridor Study Area

Source: Whitefish Transportation Plan, 2008.

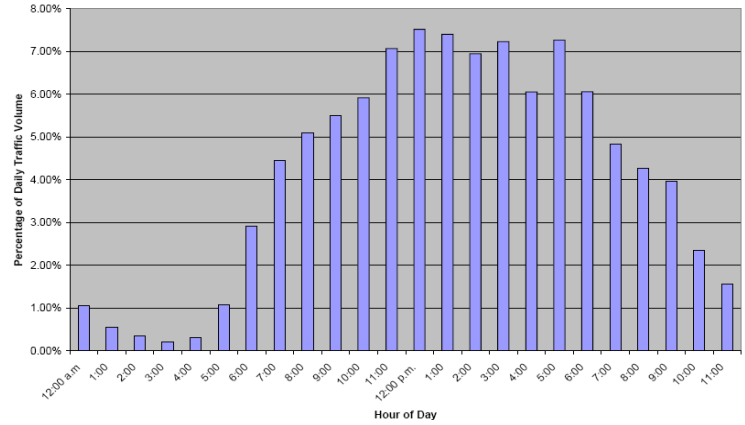
Hourly Variations in Traffic on the US 93 Corridor

The lack of a continuously recording traffic counter on the US 93 corridor in Whitefish means that trends in traffic must be identified based on short term counts at spot locations. Traffic volume data collected during August 2003 at two intersections on the US 93 corridor was reviewed to identify trends in hourly traffic variations in Whitefish. Hourly traffic volumes (expressed as a percentage of the total daily volume) at each intersection is presented below in **Figure 10**.

The traffic volume data for Spokane Avenue and 13th Street shows a peak travel period occurring between 11:00 a.m. to 6:00 p.m. with traffic volumes during each hour typically exceeding 7% of the total daily traffic at the intersection during this 7-hour long period.

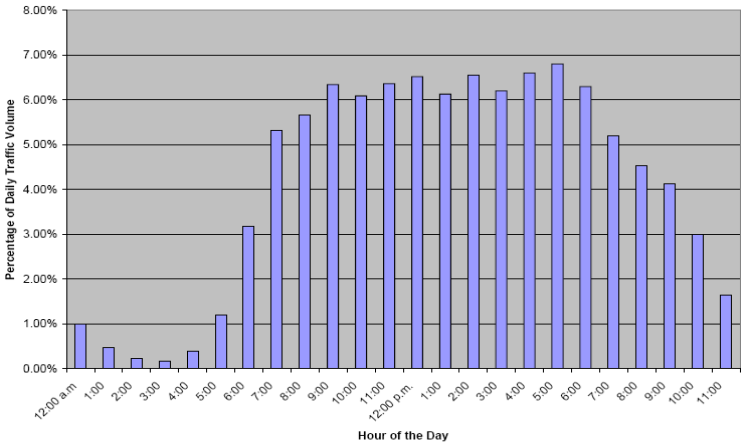
Data for the 2nd Street and Baker Avenue intersection shows a much longer sustained peak travel period—extending from 9:00 a.m. to 7:00 p.m. Traffic volumes during each hour of this 10-hour long period exceeded 6% of the total daily traffic at the intersection.

FIGURE 10: Hourly Variations in Traffic Volumes within the Corridor



Spokane Avenue/13th Street

Data collected by WGM Group, Inc. in August 2003



2nd Street/Baker Avenue

Data collected by WGM Group, Inc. in August 2003

At both intersections, the majority of the daily travel occurred between 8:00 a.m. and 10:00 p.m.

Intersection turning movement counts conducted along Spokane Avenue, 2nd Street, and Baker Avenue during 2007 showed that morning (AM) peak hours typically began between 7:30 and 8:00 a.m. and afternoon (PM) peak hours typically began between 4:30 and 5:00 p.m.

Seasonal Variations in Traffic

MDT's automatic traffic recorders—ATR Station A-24 near Kalispell and ATR Station A-60 east of Columbia Falls—provide a general indication of seasonal variations in traffic in the Flathead Valley.

Data for 2006 from these stations show that traffic volumes are typically highest from May through September and traffic volumes during peak months (July and August) may be significantly higher than AADT for the year. During 2006, ATR Station A-24 showed traffic volumes during July (the peak month) that were nearly 17% above the AADT for this station. Due to the recreational traffic on US 2, ATR Station A-60 showed July traffic volumes that were 84% higher than the AADT for the station. As expected, travel was lowest during the winter months at both these stations. In 2006,

traffic volumes at Station A-24 were lowest during January and were only about 85% of the AADT. Winter traffic volumes were typically less than 65% of the AADT at Station A-60 during 2006.

The lack of a permanent traffic counter and relevant previous traffic counts within Whitefish (and particularly the corridor study area) makes quantifying seasonal variations in traffic volumes difficult. However, it is recognized that substantial seasonal variations do occur.

Vehicle Classifications/Trucks

Comments heard during the development of this corridor study indicated large trucks (both through vehicles and construction vehicles) comprise a significant portion of the traffic on US 93.

WGM Group completed an extensive series of turning movement counts and quantified truck traffic at 13 intersections along Spokane Avenue, 2nd Street, and Baker Avenue during August 2003. For the purposes of these counts, vehicles the size of a typical UPS delivery vehicle (i.e., FHWA Vehicle Class 4 - two-axle, dual rear wheel, single-unit trucks) and larger were counted as trucks. Data was compiled on the percentage of trucks present during the AM and PM peak at each intersection. The percentages of trucks present during peak hour traffic were examined at four representative intersections in the corridor study area including Spokane Avenue and 13th Street, Spokane Avenue and 2nd Street, 2nd Street and Baker Avenue, and Baker Avenue and 5th Street. The results of these truck counts are provided in **Table 3**.

Table 3: Truck Percentages at Selected Intersections in the Corridor

Location	AM Peak Hour	PM Peak Hour
Spokane Avenue/13th Street		
Peak Hour Volume	936	1443
Number of Trucks	82	52
% Trucks in Peak Hour	**8.8%**	**3.6%**
Spokane Avenue/2nd Street		
Peak Hour Volume	668	1145
Number of Trucks	63	47
% Trucks in Peak Hour	**9.4%**	**4.1%**
2nd Street/Baker Avenue		
Peak Hour Volume	1300	1779
Number of Trucks	100	43
% Trucks in Peak Hour	**7.7%**	**2.4%**
Baker Avenue/5th Street		
Peak Hour Volume	732	1087
Number of Trucks	31	20
% Trucks in Peak Hour	**4.2%**	**1.8%**

Source: WGM Group, Inc. traffic counts during August 2003

These numbers represent the overall total truck percentages at the selected intersections during the peak hours and demonstrate that trucks comprise a notable share of the traffic present on the US 93 corridor. However, the data on truck traffic is even more dramatic if individual traffic movements

are considered at intersections along the corridor. The data shows the percentage of trucks traveling through Whitefish on US 93 ranged from 10.5% to more than 21% of all vehicles passing through the intersections during the AM peak hour. Through truck volumes on US 93 were lower during the PM peak hour and ranged from about 2% to more than 12% of all vehicles.

The presence of substantial numbers of large trucks inhibits traffic flows on US 93 and affects traffic operations at signalized intersections in the downtown area. At various times during the day, it is not uncommon for just a few large trucks to consume much of the available queuing space on 2nd Street between Spokane and Baker Avenues.

Existing Intersection Levels of Service

Urban road systems are ultimately controlled by the operation of their major intersections. Intersection failures reduce the number of vehicles that can be accommodated during peak travel hours at specific locations and lessen a roadway corridor's overall traffic volume capacity each day. Level of Service (LOS) and volume to capacity (v/c) ratios are both used as measures of effectiveness for intersection operation.

Level of Service (LOS) is a qualitative measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. It provides a "report card" type rating scale corresponding to the operation of the intersection and how it accommodates the amount of traffic using it. LOS A, B, and C represent conditions where traffic moves without significant delays during peak hour travel demands. Level of Service D and E suggest progressively worse peak hour operating conditions. Level of Service F represents conditions where significant vehicle delays and congestion occur.

The average stopped delay per vehicle is the best available measure of LOS for signalized intersections. **Table 4** shows the relationship between LOS and average stopped delay per vehicle.

Table 4: Level of Service Criteria and Average Stop Delays Per Vehicle at Signalized Intersections

Level of Service	Stopped Delay per Vehicle (sec)
A	< 10
B	10 to 20
C	20 to 35
D	35 to 50
E	50 to 80
F	> 80

Level of service for unsignalized intersections is based on the delay experienced by each major and minor street turning movements within the intersection, rather than on the overall stopped delay per vehicle at the intersection. For this reason, LOS E and even LOS F can occur for a specific turning movement; however, the majority of traffic may not be delayed (in cases where major street traffic is

not required to stop). LOS E or F conditions at unsignalized intersections generally provide a basis to study intersections further to determine availability of acceptable gaps, safety and if traffic signals are warranted.

A volume to capacity ratio (v/c) is the peak hour traffic volume at an intersection divided by the maximum volume that intersection can handle. For example, when a v/c is 0.90, peak hour traffic is using 90 percent of the intersection capacity. If traffic volumes exceed capacity, lines of vehicles (queues) will form and backups will occur until demand subsides below the available capacity. When the v/c approaches 1.0, intersection operation becomes unstable and even small disruptions can cause traffic flow to break down. Capacity—a v/c ratio of 1.0— is typically assumed to represent LOS E.

Levels of service for stop controlled intersections are also based on delay experienced by the vehicles at the intersection. The level of service is based on the approach with the highest delay as shown in **Table 5**. This table shows the LOS criteria for both the all-way and two-way stop controlled intersections.

Table 5: Level of Service Criteria for Stop Controlled Intersections

Level of Service	Stopped Delay per Vehicle (sec)
A	< 10
B	10 to 15
C	15 to 25
D	25 to 35
E	35 to 50
F	> 50

Applicable Operating Standards. MDT's Traffic Engineering Manual indicates the highway mainline or intersections should be designed to accommodate a selected design hourly volume at the selected LOS. MDT's operational standards for urban roadways and intersections are shown below in **Table 6**. These operating standards apply to US 93 within the corridor study area.

MDT's operating standards do not specify v/c ratios, however, the standards address appropriate levels of service based for various typical section designs and selected design speeds. Note that design speed is a selected speed used to determine the various geometric design features of the roadway. It is typically selected based on topography, anticipated operating speeds, adjacent land use and functional classification of the roadway. The selected design speed for each project will establish criteria for several road design elements and relates to the driver's comfort—not the speed at which a motorist will lose control of their vehicle. The desirable and minimum LOS represents anticipated operations under design year traffic volumes—typically 20 years into the future.

The recently approved City-County Growth Policy includes a goal under its Transportation element indicating the City's desire to "provide an efficient and effective transportation system to serve the present and future needs of the Whitefish area." However, the City of Whitefish has not developed policies that specify desirable or minimum LOS standards for road development within the city.

Table 6: MDT Operational Standards for Urban Roadways

Urban Principal Arterials (NHS-Non-Interstate) **Spokane Avenue/2nd Street**	**2-Lane**		**4-Lane**	
	Curbed	Uncurbed	Curbed	Uncurbed
Design Speed	40-45 mph	40-50 mph	40-45 mph	40-55 mph
Design Year Level of Service*	Desirable: **B** Minimum: **C**		Desirable: **B** Minimum: **C**	
Urban Minor Arterials (Non NHS) **Baker Avenue**	**2-Lane**		**Multi-lane**	
	Curbed	Uncurbed	Curbed	Uncurbed
Design Speed	35 mph	35 mph	35 mph	35 mph
Design Year Level of Service*	Desirable: **B** Minimum: **C**		Desirable: **B** Minimum: **C**	
Urban Collectors (Non NHS)	Curbed		Uncurbed	
Design Speed	30 mph		30 mph	
Design Year Level of Service*	Desirable: **C** Minimum: **D**			

Source: Montana Department of Transportation, Road Design Manual, Chapter Twelve-Geometric Design Tables, Figures 12-7, 12-8 and 12-9, December 2004.

Existing Intersection Levels of Service. During the spring and summer of 2007, four signalized intersections and six high-volume unsignalized intersections on US 93 and Baker Avenue were counted to generate traffic data needed to calculate levels of service. Each intersection was counted between 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., to ensure that the intersection's peak volumes were represented. Additionally, peak hour traffic information from previous projects were obtained for two other stop controlled intersections on Baker Avenue and used for the LOS analysis. Intersections considered in the LOS analysis are listed below. Note that intersections marked by an asterisk (*) were not counted by RPA.

Signalized intersections

- Spokane Avenue and 13th Street
- Spokane Avenue and 2nd Street
- Central Avenue and 2nd Street
- Baker Avenue and 2nd Street

Unsignalized intersections

- Spokane Avenue and 1st Street
- Spokane Avenue and 4th Street
- Spokane Avenue and 5th Street
- Baker Avenue and 4th Street
- Baker Avenue and 5th Street
- Baker Avenue and 7th Street
- Baker Avenue and 10th Street*
- Baker Avenue and 13th Street*

Using the procedures outlined in the Transportation Research Board's *Highway Capacity Manual – Special Report 209*, the Highway Capacity Software, and relevant traffic data from 2007, the LOS for each of the identified intersections within the corridor was calculated. **Table 7** shows the current AM and PM peak hour LOS for each individual leg of the signalized intersections evaluated, and an overall LOS for the entire intersection.

The results of the LOS analysis for unsignalized intersections under current traffic conditions are shown in **Table 8**.

The LOS analyses of the existing conditions reveals that some approaches at signalized intersections and several unsignalized intersections on the US 93 corridor and Baker Avenue are currently functioning at LOS D or lower. These intersections are highlighted in **Tables 7** and **8.** LOS D or lower is indicative of intersections where geometric changes or operational improvements may be warranted.

Table 7: Peak Hour LOS for Signalized Intersections in the Corridor

2007 AM Peak LOS					
Intersection	EB	WB	NB	SB	INT
Spokane Avenue & 2nd Street	B	B	D	B	C
Spokane Avenue & 13th Street	C	C	B	C	C
Baker Avenue & 2nd Street	D	C	A	B	C
Central Avenue & 2nd Street	B	C	A	A	B
2007 PM Peak LOS					
Intersection	EB	WB	NB	SB	INT
Spokane Avenue & 2nd Street	B	B	F	C	F
Spokane Avenue & 13th Street	C	C	B	D	C
Baker Avenue & 2nd Street	F	D	B	B	E
Central Avenue & 2nd Street	C	C	A	A	C

Table 8: Peak Hour LOS for Unsignalized Intersections on US 93 and Baker Avenue

2007 LOS (Stop-Controlled Intersections)					
Intersection	AM	PM	Intersection	AM	PM
Spokane Avenue & 1st Street	A	A	Baker Avenue & 4th Street	B	D
Spokane Avenue & 4th Street	C	C	Baker Avenue & 5th Street	B	C
Spokane Avenue & 5th Street	C	D	Baker Avenue & 7th Street	B	C
			Baker Avenue & 10th Street*	B	B
			Baker Avenue & 13th Street*	B	C

***** intersection not counted by RPA

Please note that turning movement counts were not performed at every intersection along Spokane Avenue or Baker Avenue during 2007. Therefore, peak hour LOS data is not available for some unsignalized intersections along these roadways and LOS analyses were not performed for all intersections.

Corridor Capacity

Roadway capacity is of critical importance when looking at the growth of a community and the ability of existing facilities to accommodate present and future traffic volumes. The capacity of a road is a function of a number of factors including: how intersections along the corridor function;

the land use adjacent to the road and associated controls; side approaches and intersection spacing; road alignment and grade; speed; turning movements; vehicle fleet mix; street network management, and good planning and maintenance. As traffic volumes increase, vehicle flows deteriorate and delays increase. When traffic volumes approach and exceed the available capacity, roadway operations begin to fail. For this reason, it is important to look at the existing size and configuration of the US 93 corridor roadways to determine their ability to meet existing and future traffic needs.

The number of lanes is the primary factor used to evaluate roadway capacity, since any lane configuration has an upper volume limit regardless of how carefully it has been designed. The function of intersections is a very critical element and can artificially limit lane capacity. In general, two-lane roads can accommodate up to 12,000 vehicles per day, three-lane roads can carry between 12,000 and 18,000 vehicles per day, and four-lane roads can handle between 18,000 and 24,000 vehicles per day Five-lanes or more are required to handle volumes over 24,000 vehicles per day.

The volume to capacity (v/c) ratio is indicative of whether roadways have adequate numbers of travel lanes for the traffic volumes using the facility. By definition, the "v/c ratio" is the result of the flow rate (number of vehicles per unit of time) of a roadway lane divided by the capacity of the roadway lane over the time period. **Table 9** shows "v/c ratios" and their corresponding roadway corridor "level-of-service" designations. Areas of concern are segments within individual corridors that have a volume to capacity ratio of 0.8 or higher. This limitation on road capacity leads to congestion. Ratios of 1.0 or more suggest the road is beyond its ability to accommodate traffic flows.

Table 9: Volume to Capacity (v/c) Ratios and LOS Designations

v/c Ratio	Description	Corridor LOS
< 0.59	Well Under Capacity	LOS A and B
0.60 – 0.79	Under Capacity	LOS C
0.80 – 0.99	At or Nearing Capacity	LOS D and E
> 1.00	Over Capacity	LOS F

The travel demand model developed for the Whitefish Transportation Plan makes it possible to estimate current and projected traffic volumes on all major roadways and identify v/c ratios for major roadways within the community. The v/c ratios generated through the modeling effort were used to gauge the overall LOS provided by Spokane Avenue, 2nd Street, and Baker Avenue are presented in **Table 10**.

Based on the modeling results for current traffic volumes, v/c ratios are indicative of undesirable levels of service on numerous roadway sections of Spokane Avenue between Riverside Avenue and 1st Street, on 2nd Street west of Baker Avenue, and on Baker Avenue north of 2nd Street and between 6th and 13th Streets. Locations that are currently approaching capacity or over capacity are highlighted in **Table 10**.

Table 10: Current Volume to Capacity (v/c) Ratios for the US 93 Corridor (Spokane Avenue and 2nd Street) and Baker Avenue

Location	v/c Ratio	LOS	Current Volumes?
US 93 - Spokane Avenue			
18th St to 13th St	0.44	LOS A and B	
13th St to Riverside Avenue	0.73	LOS C	
Riverside Avenue to 9th St	1.02	LOS F	
9th St to 6th St	0.97	LOS D and E	
6th St to 3rd St	0.79	Approaching LOS D	
3rd St to 2nd St	0.58	LOS A and B	
2nd St to 1st St	0.86	LOS D and E	
US 93 – 2nd Street			
Spokane Ave to Kalispell Ave	0.62	LOS C	
Spokane to Baker	0.62	LOS C	
Baker Avenue to WF River	0.72 - 0.89	At or near LOS D and E	
Baker Avenue			
2nd St to Railway St	0.84 – 0.98	LOS D and E	
2nd St to 3rd St	0.60	LOS C	
3rd St to 6th St	0.75	LOS C	
6th St to 13th St	0.96	LOS D and E	
13th St to 18th St	0.77 – 0.66	LOS C	

Signalized Intersection Capacity

The Intersection Capacity Utilization (ICU) method is another signalized intersection planning-level tool that can be used to estimate how much reserve capacity is available or how much the intersection is over capacity.

The ICU method considers saturation flow rates for individual lanes to help establish volumes of vehicles that could potentially pass through an intersection and gauge the capacity of signalized intersections. The saturation flow rate is defined as the flow in vehicles per hour that can be accommodated by each lane **assuming that the green phase is displayed 100 percent of the time**. Saturation flow rates can be measured in the field or calculated by applying adjustment factors to a default "ideal" saturation flow rate.

Theoretically, the ideal saturated flow rate for intersections in medium density areas with operating speeds of 25 to 35 mph is 1,900 vehicles per hour per lane (vphpl). This flow rate is also used as a "default" value in the *Highway Capacity Manual*. Actual measurements of saturated flow rates have found variations between 1,700 vphpl to more than 2,100 vphpl depending upon intersection conditions. Higher speed facilities will typically have higher saturated flow rates. Ideal saturation flow rates for various intersections are shown below:

1700 vphpl Central Business District with slow speeds, short block spacing, transit, and parking activity

1900 vphpl	Medium density areas with speeds of 25 to 35 mph
2000 vphpl	Interchanges and limited access intersections with speeds of 35 to 50 mph
2100 vphpl	High-speed intersections on limited access roadways

Analysts typically adjust these ideal saturated flow rates to account for operational factors and other influences at intersections like lane widths, heavy vehicles, approach grades, on-street parking, bus stops, area type, lane utilization, turning movements and bicycle and pedestrian conflicts.

Analysis work done for the Spokane Avenue and 2nd Street and 2nd Street and Baker Avenue intersections shows saturated flow rates of around 1800 vphpl after making adjustments for turning movements at these locations. Saturation flow rates at the signalized intersections on Spokane Avenue and 2nd Street in downtown Whitefish would be further reduced if other factors such as the spacing of intersections, on-street parking, pedestrian conflicts, truck percentages, and the lack of coordination between signals are considered.

Under current conditions, ICU analyses suggest the intersection of 2nd Street and Baker Avenue is operating over capacity and the other signalized intersections are operating slightly below their capacities. It is important to recognize that while the ICU method can provide reasonable estimates for intersection capacity conditions, it should not be used for detailed operational analysis since it does not consider vehicle delays.

SAFETY ANALYSIS

Recent Crash Data for the Corridor

Crash data for a three-year time period from October 1, 2003 to September 30, 2006 were obtained from the MDT Traffic and Safety Bureau to identify areas of traffic safety concern and help assess the overall safety performance of the US 93 corridor and adjoining streets. The crash data showed there were no fatal accidents along the US 93 corridor or on Baker Avenue during this three-year time period. Over the three-year period examined, 84 crashes were reported on the US 93 corridor and 24 crashes occurred along Baker Avenue between 2nd Avenue and 13th Street.

Records for the US 93 corridor shows that 20 of the 84 reported crashes resulted in injuries or possible injuries to 29 people—including one pedestrian—and 64 crashes involved property damage only. All but 10 of the reported crashes involved two or more vehicles. The most common multiple-vehicle crashes along Spokane Avenue and 2nd Street were rear-end collisions (51%), right-turn/angle collisions (22%), sideswipe collisions (8%) and left turn collisions (8%). The remainder of the crashes involved single vehicles or listed as unknown in the crash summary. About 24% (20 of 84 crashes) occurred during hours of darkness or in low light conditions. Eighteen percent of the crashes occurred on wet roadway surfaces and 8% occurred on icy or snowy roadways.

On Baker Avenue between 2nd and 13th Streets, a total of 24 crashes were reported during the three-year study period. Eight of these crashes produced injuries or possible injuries to 11 people and the remainder resulted in just property damage. Twenty-one (21) of the reported crashes involved two or more vehicles. The most common collision types were rear-ends (67%), sideswipes (19%) and collisions involving left turning vehicles (9%). About 29% of the reported collisions occurred during dawn, dusk or nighttime light conditions. Six accidents occurred on snowy roads and two other crashes took place on wet roadway surfaces.

Seventy-three (73) of the 84 crashes on Spokane Avenue and 2nd Street during the three-year study period were attributed to intersections along the corridor. Six of the intersections on the US 93 corridor had 5 or more reported crashes during the study period including: Spokane Avenue and 13th Street (17); Spokane Avenue and 4th Street (8); Spokane Avenue and 3rd Street (7); Spokane Avenue and 2nd Street (11); 2nd Street and Central Avenue (5); and 2nd Street and Baker Avenue (14).

Fifteen (15) of the 24 crashes on Baker Avenue between 2nd and 13th Streets during the three-year study period occurred at intersections along the corridor. Six (6) crashes were reported at the intersection of Baker Avenue and 13th Street and 3 each occurred at Baker Avenue's intersections with 4th Street and 10th Street.

Since crashes at intersections comprise 87% of all the reported crashes along Spokane Avenue and 2nd Street and 63% of the crashes reported on Baker Avenue, the crash trends at intersections along the US 93 corridor and along Baker Avenue were evaluated in more detail.

Tables 11 and **12** identify the number and severity of reported crashes at intersections along

Spokane Avenue, 2nd Street, and Baker Avenue. The tables also present estimated crash rates for each intersection with more than 3 crashes during the study period.

The severity index included in **Tables 11** and **12** reflect the methodology used by MDT to determine "severity index ratings" based on three categories of severity—property damage only (PDO), non-incapacitating injury crash, and fatality or incapacitating injury and a weighting factor assigned to each category.

Table 11: Crashes at Intersections along the US 93 Corridor (October 1, 2003 – September 30, 2006 Period)

Cross Street US 93 Reference Post	Traffic Control	Total Reported Crashes	Fatal Crash	Injury Crash (# inj)	PDO Crash	Severity Index Rating	Crash Rate
Spokane Avenue							
13th Street 126.937	Signal	17	0	7 (9)	10	1.82	0.54
Riverside Ave (East only) 127.139	Stop sign	0	0	0	0	0.00	--
9th Street (East only) 127.172	Stop sign	2	0	0	2	1.00	--
8th Street (East only) 127. 240	Stop sign	1	0	0	1	1.00	--
7th Street (East only) 127.308	None	2	0	1 (1)	1	2.00	--
6th Street 127.376	Stop signs	3	0	0	3	1.00	--
5th Street 127.478	Stop signs	3	0	0	3	1.00	--
4th Street 127.546	Stop signs	8	0	3 (4)	5	1.75	0.67
3rd Street 127.615	Stop signs	7	0	3 (4)	3	1.86	0.57
2nd Street 127.684	Signal	11	0	1 (1)	10	1.18	0.43
2nd Street							
Spokane Ave 127.684	**Same as above for intersection of Spokane Avenue and 2nd Street**						
Central Ave 127.700	Signal	5	0	1 (3)	4	1.40	0.23
Baker Ave 127.740	Signal	14	0	2 (5)	12	1.29	0.64

Table 12: Crashes at Intersections along Baker Avenue
(October 1, 2003 – September 30, 2006 Period)

Cross Street	Traffic Control	Total Reported Crashes	Fatal Crash	Injury Crash (# inj)	PDO Crash	Severity Index Rating	Crash Rate (MEV)
2nd Street (US 93)	Signal	14	0	2 (5)	12	1.29	0.64
3rd Street	Stop signs	3	0	3 (4)	0	3.00	--
4th Street	Stop signs	2	0	1 (2)	1	2.00	--
5th Street (East) (Park access to West)	Stop signs	1	0	0	1	1.00	--
6th Street (West only)	Stop sign	0	0	0	0	0.00	--
7th Street (West only)	Stop sign	0	0	0	0	0.00	--
8th Street (West only)	Stop sign	0	0	0	0	0.00	--
10th Street	Stop signs	3	0	0	3	1.00	--
13th Street	4-way stop	6	0	1 (1)	5	1.33	0.52

Crash rates for intersections along US 93 or Baker Avenue with more than three crashes during the study period were calculated based on the total number of crashes and an estimate of the daily traffic entering each intersection over the three-year period. The crash rates for the intersections shown in **Tables 11** and **12** are expressed in terms of crashes per million entering vehicles (MEV). It should be noted that crash rates may vary notably from year to year due to a variety of factors (extreme weather events, construction, etc.).

Along the US 93 corridor and Baker Avenue, the intersections with the highest numbers of crashes during the study period are generally the same ones that experience the highest daily traffic volumes. Crash rates are somewhat depressed due to the relatively high volumes of traffic entering these intersections each day.

As the tables above show, the estimated crash rates for the selected intersections along US 93 and Baker Avenue during the three year study period ranged from 0.23 to 0.67 crashes per MEV. These estimated crash rates are not considered extremely high when compared with intersections in other urban areas of Montana. For example, the *Kalispell Transportation Plan (2006 Update)* shows 8 intersections within the community with crash rates between 1.00 and 1.66 crashes per MEV. The crash rates at these selected intersections are generally among the highest rates for all intersections evaluated in the *Whitefish Transportation Plan-2007*.

Apparent Crash Trends at Intersections along US 93

In an effort to better understand the crash history at intersections along US 93, additional data for those locations with five or more crashes during the three-year study period were analyzed. This analysis considered crash types, road surface and light conditions, information about the intent of motorists involved in crashes, direction of travel, vehicles involved, and contributing

circumstances to each crash. The evaluation of crash types and other contributing factors helps determine the primary causes for the crashes and may be indicative of possible engineering solutions needed to reduce certain crashes. **Table 13** presents the primary crash types and other relevant crash data for selected intersections on US 93 during the three-year analysis period.

Table 13: Crash Types at Intersections along the US 93 Corridor (October 1, 2003 – September 30, 2006 Period)

Cross Street US 93 Reference Post	Predominant Crash Types	Comments
Spokane Avenue		
13th Street **RP 126.937** **(17 Crashes)**	6 – Rear-end collisions 3 – Left turn collisions 3 – Right angle collisions 2 - Sideswipes (Same direction)	▪ 12 of the crashes occurred during the spring/summer months (May through September) ▪ The location of 9 crashes were classified as driveway related or non-junction ▪ 1 crash involved a pedestrian
4th Street **RP 127.546** **(8 Crashes)**	5 – Rear-end collisions 2 – Right angle collisions 1 - Sideswipe (Same direction)	▪ All crashes involved two or more vehicles ▪ 1 rear-end collision involved a school bus and another rear-end collision involved a tractor/trailer ▪ Only 2 of the crashes involved vehicles turning onto or off of Spokane Avenue ▪ 2 crashes occurred on wet pavement
3rd Street **RP 127.615** **(7 Crashes)**	4 – Rear-end collisions 1 – Left turn collision 1 – Right angle collision	▪ 6 of the 7 crashes occurred during the summer months (June-August) ▪ 1 of the crashes involved a collision with a parked vehicle
2nd Street **RP 127.684** **(11 Crashes)**	4 – Rear-end collisions 4 – Right angle collisions 2 – Left turn collisions 1 – Fixed object collision	▪ All crashes occurred in the intersection or were intersection related. ▪ 4 of the right or left turning collisions involved southbound and westbound vehicles. ▪ 5 of the crashes occurred at night ▪ 4 crashes occurred on wet or snowy pavement ▪ 1 crash involved a bicyclist
2nd Street		
Central Ave **RP 127.700** **(5 Crashes)**	2 – Rear-end collisions 1 – Right angle collision 1 – Fixed object collision	▪ Crashes included one fixed object collision with a post by a WB right turning vehicle and a collision with a parked vehicle on 2nd Street.
Baker Ave **RP 127.740** **(14 Crashes)**	5 – Rear-end collisions 2 – Fixed object collisions 1 – Right turn collision 2 – Right angle collisions 2 - Sideswipes (Same direction)	▪ Crashes evenly divided among those that occurred on 2nd Street and those on Baker Avenue. ▪ 12 of the 14 crashes occurred in the intersection or were intersection related. ▪ 4 of the 5 crashes involving right turning vehicles involved WB vehicles on 2nd Street. ▪ 2 crashes involved WB truck/trailers colliding with light poles while making a right turn onto Baker. ▪ 5 of the 14 crashes involved truck/trailers and 1 involved a construction vehicle.

Summary of the US 93 Corridor Crash Analysis

The predominant crash type along the US 93 corridor during the three-year analysis period was rear-end collisions followed by right-turn and right angle collisions, sideswipes, and left turn collisions. These types of collisions are typical of roadways experiencing periods of traffic congestion. Rear-end collisions are often the result of sudden and unexpected slowing or stopping coupled with inadequate following distance. The lengthy queues of vehicles stopped at signalized intersections along Spokane Avenue and 2nd Street and vehicles entering traffic streams from side streets or driveways likely contributing factors to rear-end collisions along US 93.

Crashes involving left or right-turning vehicles and right angle collisions are often the result of drivers misjudging the speed and/or distance of oncoming traffic and mistakenly turning in front of or into an oncoming vehicle. Due to the high traffic volumes on US 93 during portions of the day, drivers attempting to enter or cross traffic on Spokane Avenue from side streets may sometimes become impatient and cause conflicts with approaching vehicles.

Sideswipe collisions within the corridor may suggest the need for improved centerline or lane markings. They may also be reflective of a rather narrow roadway, particularly in areas of the corridor where parking exists along both sides of the street.

The fixed object collisions recorded at the intersections of Spokane Avenue and 2nd Street and 2nd Street and Baker Avenue, suggests the need for geometric modifications to increase turning radii at these intersections for large vehicles.

PEDESTRIAN/BICYCLE FACILITIES IN THE CORRIDOR

Sidewalks

Sidewalks exist along both sides of Spokane Avenue from 13th Street to 2nd Street and along the majority of 2nd Street from Spokane Avenue westward to the Whitefish River crossing. Sidewalks also parallel both sides of Baker Avenue between Railway Street and 13th Street.

Sidewalks along US 93 South, Spokane Avenue and Baker Avenue are typically 5 feet wide and even wider in front of businesses on 2nd Street and meet the Americans with Disabilities Act (ADA) minimum standard for width (5 feet). Intersections along the corridor typically include curb ramps for wheelchair accessibility on two or more corners. Please note that work for this corridor study did not include a detailed evaluation to determine if existing sidewalks comply with all ADA standards (grade, cross-slope, obstacles, etc.).

Crosswalks

Table 14 identifies pedestrian crosswalk locations along Spokane Avenue, 2nd Street, and Baker Avenue. Crosswalks have been installed on all approaches at the signalized intersections in the corridor and at several other intersections with stop-controlled side approaches. A mid-block crosswalk with curb ramps also exists on Baker Avenue at Riverside Park. All crosswalk locations are delineated by painted pavement striping with painted stop bars in advance of each crosswalk.

Advance crosswalk warning signs have been installed to alert motorists well ahead of the crosswalks on Spokane Avenue at 4th and 5th Streets and on Baker Avenue at 4th Street. The crosswalk at Spokane Avenue and 4th Street also has overhead flashing lights for all approaches to reinforce that the crossing is used by school children.

Pedestrian push buttons and pedestrian signal (WALK/DON'T WALK) indicators are provided on the poles supporting signal mast arms on all legs of the intersection at Spokane Avenue and 13th Street. Pedestrian pushbuttons (typically installed with pedestrian signals) are electronic buttons used by pedestrians to change traffic signal timing to accommodate street crossings. Vehicle traffic is not delayed if pedestrians are not present to signal the need for crossing.

Pedestrian signal indicators are provided at Spokane and 2nd and 2nd and Central, but not at 2nd and Baker.

It was noted that a portable "Pedestrian Crossing" sign placed on the centerline of the roadway is used to reinforce the presence of the crosswalk at Baker Avenue and 3rd Street for approaching motorists. This sign is not used during the winter months due to the need to plow snow from the roadway.

Table 14: Crosswalks Along the US 93 Corridor and Baker Avenue

Crosswalk Locations	Relation to Intersection
Spokane and 13th Street*	All corners
Spokane and 5th Street	North of cross street
Spokane and 4th Street	North and south of cross street
Spokane and 2nd Street*	All corners
2nd Street and Central Avenue*	All corners
2nd Street and Baker Avenue*	All corners
Baker Avenue and 3rd Street	South of cross street
Baker Avenue and 4th Street	South of cross street
Baker Avenue (South of 5th)	Mid-block at Riverside Park
Baker Avenue and 13th Street*	All corners

* Signalized intersection

Designated Pedestrian and Bicyclist Trails in the US 93 Corridor

The City of Whitefish prepared and approved the Whitefish Bicycle and Pedestrian Master Plan which identifies a safe, usable, and functional transportation system for pedestrians and bicyclists within the community. The City has also formed a Pedestrian and Bicycle Path Advisory Committee to help guide the development of a non-motorized trail network in the community and routinely update the Bicycle and Pedestrian Master Plan. The City's Pedestrian and Bicycle Path Advisory Committee has routinely updated the recommendations in the plan.

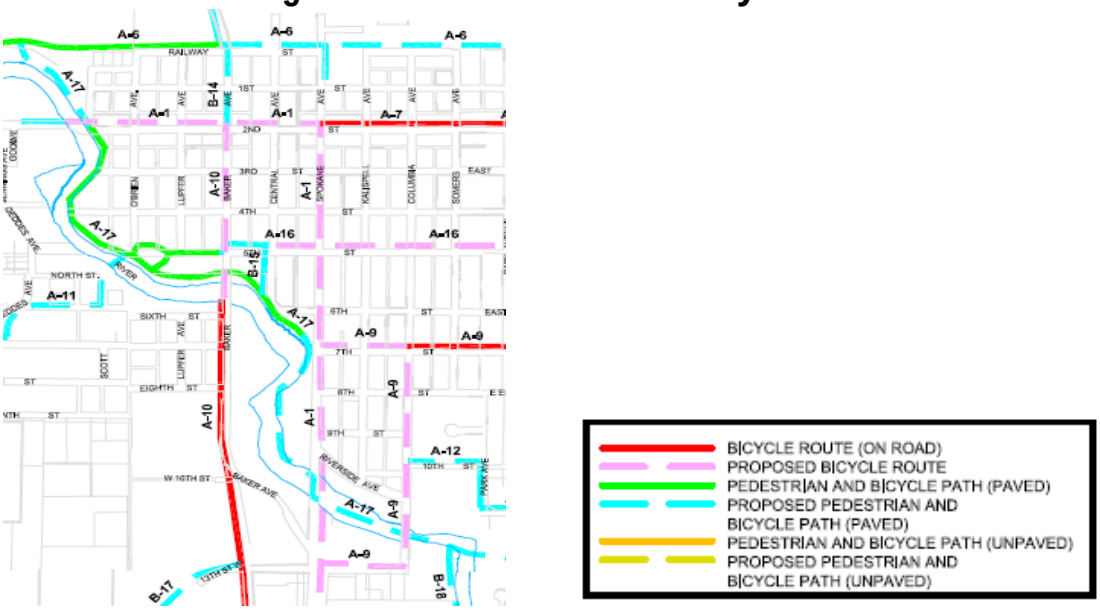
According to the City's Bicycle and Pedestrian Master Plan, the US 93 corridor (Spokane Avenue and 2nd Street) is designated as a proposed bike route with links to other designated bicycle routes and paths. Numerous other designated pedestrian or bicyclist trails cross or parallel US 93

and Baker Avenue. Both existing and proposed trails are identified and described in **Table 15** and shown in **Figure 11**.

Table 15: Designated Trails within the US 93 Corridor Listed in the Whitefish Bicycle and Pedestrian Master Plan

Trail #	Identification	Description	Location	Trail Type	Preferred Facility
	U.S. Highway 93 Corridor	This trail begins south of Whitefish and extends northerly through the City along Spokane Avenue. The trail joins 2nd Street and follows the route westerly through the City past Whitefish Lake Golf Course.	On-Street	Bicycle Route and Walkway	Bicycle Lane Sidewalk/Ped Path
A-7	2nd Street East	The trail follows 2nd Street from Spokane Avenue east past Armory Fields and across the BNSF Railway before joining Edgewood Place outside the City.	On-Street	Bicycle Route	Shared Road, Bicycle Lane, Wide Curb Lane
	7th Street - Columbia Avenue	The trail includes 7th Street between Spokane Avenue and the Cow Creek Trail and a segment of Columbia Avenue between the Whitefish River bridge and 7th Street. The trail then follows 13th Street from US 93 to Columbia Avenue.	On-Street	Bicycle Route	Shared Road
	Baker Avenue - Riverside/Baker Parks	This north-south trail extends along Baker Avenue from 2nd Street past Riverside and Baker Parks to Commerce Street. A short segment along Commerce connects the trail to US 93.	On-Street	Bicycle Route	Shared Road
A-16	5th Street	The trail extends from Baker Park due east along 5th Street to Muldown Elementary and Whitefish High Schools.	On-Street	Bicycle Route and Walkway	Bicycle Lane/ Sidewalk
A-17	Whitefish River Trail	This trail follows the Whitefish River from the BNSF Railway through the community to where the river is joined by Cow Creek.	Off-Street	Bicycle Route and Walkway	Two-Direction Pedestrian/ Bicycle Path
B-14	Baker Ave	Follows Baker Ave from 2nd St to Railway St.		Proposed Paved Bicycle Routes and Walkways	
B-15	6th St	Follows 6th St from 5th Street to Whitefish River Trail.			
B-17	13th St	Heads SW from the intersection of 13th St and Baker			
NONE	Spokane Avenue	Link between A-1/A-7 and Proposed A-6			

FIGURE 11: Designated Pedestrian and Bicyclist Trails in the Corridor



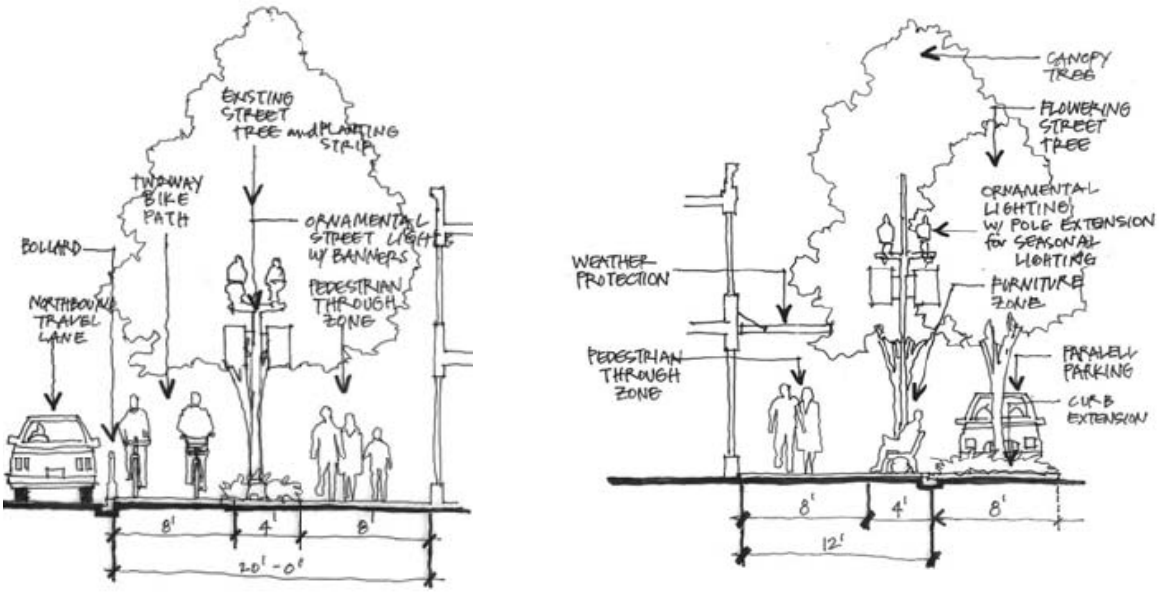
Proposed Pedestrian and Trail Amenities on US 93

The Whitefish Downtown Business District Master Plan advocates the development of a pedestrian-friendly environment to encourage visitors and residents to utilize downtown businesses. The Plan calls for extensive pedestrian improvements throughout the downtown to support and improve the viability of retail businesses, to improve pedestrian safety along and across 2nd Street, and provide connections to adjacent neighborhoods.

The Plan recommends the development of the "Whitefish Promenade"— an off-street, multi-use recreational trail around the downtown— intended to link adjacent neighborhoods, the city's pedestrian and bike network and parklands along the Whitefish River. A portion of the Whitefish Promenade is proposed along the west side of Spokane Avenue from 7th Street to Railway Street. The Plan also called for a pedestrian-priority streetscape design for 2nd Street between Spokane and Baker Avenues.

Conceptual sketches illustrating recommended multi-use trail design along Spokane Avenue and pedestrian improvements along 2nd Street are shown below in **Figure 12**.

FIGURE 12: Proposed Pedestrian Designs along US 93



"Whitefish Promenade" Design **2nd Street Pedestrian Priority Design**

Source: Whitefish Downtown Business District Master Plan, Crandall Arambula PC, December 2005

Pedestrian and Bicyclist Involvement in Corridor Crashes

The incidence of crashes involving pedestrians or bicyclists on US 93 or Baker Avenue within the corridor study area is low. Data for the period from October 1, 2003 to September 30, 2006 showed only one crash involving a pedestrian—an incident at the intersection of Spokane and 13th Street that resulted in an injury. This location is the first pedestrian crossing that northbound motorists reach when traveling into Whitefish from the south.

One crash during the three-year period examined for this study involved a bicyclist and occurred at the intersection of Spokane Avenue and 2nd Street. The bicyclist was traveling east on 2nd Street and was injured after being struck by a turning construction vehicle. Public comments to date have not indicated that unreported bicycle-related crashes are a common occurrence in Whitefish.

OTHER TRANSPORTATION MODES

Rail Service

Whitefish is located on one of the two main railroad lines operated by the BNSF Railway in Montana and both passenger and freight service are available in the community.

Amtrak, the National Railroad Passenger Corporation, operates across the northern portion of Montana and stops at Whitefish. Amtrak's Empire Builder provides daily passenger service between Chicago and Seattle. Each day, a westbound train departs during the evening (at about 9:00 p.m.) and an eastbound train departs each morning (at about 7:30 a.m.). Whitefish is a summer and winter tourist destination for rail passengers due to its proximity to Big Mountain and Glacier National Park. Amtrak statistics show Whitefish is the busiest Amtrak station between Minneapolis and Seattle with more than 68,200 passenger arrivals or departures recorded during fiscal year 2006. This represented a 12% increase over 2005 ridership totals for the Whitefish station. The Amtrak passenger station is located in the historic Whitefish Depot at the north end of Spokane Avenue in downtown Whitefish.

Railroad freight service is also available in Whitefish. The BNSF Railway operates about 60 trains per day through Whitefish, carrying agricultural products and other cargo. According to the *2000 Montana State Rail Plan Update*, the BNSF's Wolf Point-Havre-Shelby-Libby Main Line through Whitefish is considered a major transcontinental rail freight route. Railroad freight facilities are generally located west of the grade-separated crossing on Wisconsin Avenue.

Air Service

Glacier Park International Airport is located 11 miles southeast of Whitefish and accessed from US 93 via Montana Highway 40 and US Highway 2. The airport offers numerous daily flights and is served by Delta (with Sky West connections), Northwest, Horizon, and America West Airlines.

Transit Services

Whitefish is served by Rimrock Trail Lines with daily coach service to Missoula. In Missoula, passengers can make connections via other Rimrock buses or transfer to Greyhound system.

Eagle Transit provides general public transportation service in Flathead County. Eagle Transit, controlled by the Flathead County Area IX Agency on Aging, was initially focused on serving the elderly. In recent years, Eagle Transit has expanded to serve the disabled population and general public within the county. Eagle Transit currently provides a variety of services including Kalispell city bus route, county-wide "door to door" service with scheduled routes in Columbia Falls and

Whitefish, and demand-response intercity services. Service was recently expanded in Columbia Falls and the Canyon area. The "door to door" service varies by community and is designed to meet the needs of the elderly and disabled.

In late February 2008, Eagle Transit began offering an inter-city public bus system for commuters, with routes serving Kalispell, Whitefish and Columbia Falls. In response to many requests for such a commuter service, Eagle Transit has set up Kalispell-Whitefish, Whitefish-Columbia Falls and Kalispell-Columbia Falls routes with 8 buses. The buses are Glacier National Park tour buses, which are only used in July and August. Under a cooperative agreement between the Flathead County, MDT and Glacier National Park, Eagle Transit may use the buses until early July. After that time, the buses will be used by Glacier National Park until September 1. During the summer, County officials will evaluate the success of the bus system and seek operating money if the decision is made to continue the inter-city commuting service next year.

The commuter buses will run between 5:55 a.m. and 7 p.m. Monday through Friday, with a variety of designated or requested stop locations in each city. Whitefish stops are at North Valley Hospital, the Mountain Mall and Midway Mini-Mart. Buses headed to Kalispell will leave designated stops in Whitefish between 6:36 and 6:51 a.m. and 8:15 and 8:30 a.m. each morning and arrive at designated stops in Whitefish between 4:29 and 4:44 p.m. and 6:08 and 6:23 p.m. each evening. Buses to and from Columbia Falls will leave designated stops in Whitefish between 6:53 and 7:00 a.m. and 8:23 and 8:30 a.m. each morning and arrive back at Whitefish stops between 4:08 and 4:15 p.m. and 5:43 and 5:50 p.m. each evening.

Monthly passes for the Eagle Transit commuter buses are available for $25 or passengers can pay $1 each way. Each new bus seats 23 passengers and has straps for 30 standing passengers plus a rack for two bicycles. The buses are fully accessible to wheelchair-bound passengers.

Locally, the SNOW (Shuttle Network of Whitefish) Bus provides complimentary transport to and from the Mountain Mall and the Whitefish Mountain Resort from late November through mid April. This seasonal shuttle service is paid for by local businesses.